

Appl. No. 10/726,292  
Amdt. Dated October 27, 2004  
Reply to Office Action of July 27, 2004

Attorney Docket No. 19629.0002  
Customer No.: 26021

REMARKS/ARGUMENTS:

Claims 1-15 are pending in the application. Reexamination and reconsideration of the application, in view of the following remarks, are respectfully requested. A declaration under 37 C.F.R. § 1.132 submitted concurrently herewith, supports the data referenced in this section.

The present invention relates to a liquid crystal composition suitable for use mainly in an active matrix (AM) element, and an AM element comprising the composition. (Applicant's specification, at p. 1, lines 7-9).

CLAIM REJECTIONS UNDER 35 U.S.C. § 102:

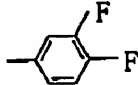
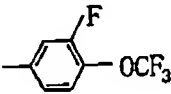
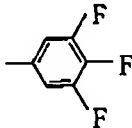
Claims 1, 6, and 9-14 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Andou et al. (U.S. Patent No. 6,007,740 or 6,187,223). The Applicant respectfully traverses the rejection.

The Office states that the formula (1-2) which is an essential component of the present application is disclosed in the Use Examples 24 and 26 of U.S. Patent No. 6,007,740. The Applicant respectfully disagrees. The formula (1-2) of the present application is not described in these Use Examples. The formula (1-2) of the present application has a feature in the right portion of the molecule as shown in the left column of Table 1. In contrast, compounds disclosed in Use Examples 24 and 26 each have a different feature in the right portion of the molecule as shown in the right column of Table 1. The compounds disclosed in Use Examples 24 and 26 in US 6,007,740 are completely different than those expressed by the formula (1-2) of the present application.

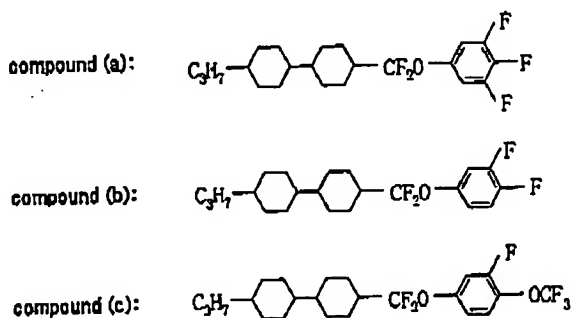
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Table 1 Difference between formula (1-2) of the present application and the compound disclosed in US6,007,740

Feature of formula (1-2) of the present application	Feature of Use Examp1s 24, 26 in US6,007,740
 or 	

Furthermore, US 6,007,740 cannot render the present invention obvious. As a typical compound from US 6,007,740, a compound (a) is selected, while as typical compounds expressed by formula (1-2) of the present application, compounds (b) and (c) are selected.

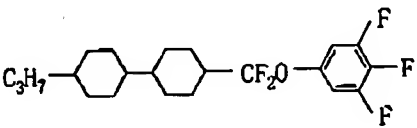
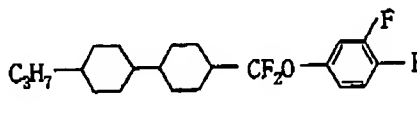
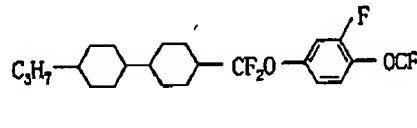


Comparison is made between these compounds with regard to their characteristics relating to the upper limit temperature of nematic phase and viscosity, both of which are target items of the present invention. The result of the comparison is shown in Table 2 below. (Declaration, pp. 2-3).

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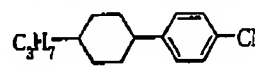
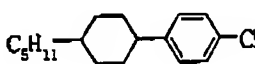
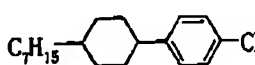
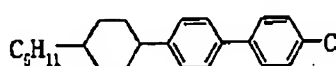
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Table 2 Comparison of compounds

		Upper limit temperature of nematic phase (°C)	Viscosity(mPa·s)
compound(a)		88.4	41.1
compound(b)		108.4	30.0
compound(c)		103.0	33.0

Note : Upper limit temperature of nematic phase and viscosity are each an extrapolated value obtained by measuring 15wt% mixture of the sample in mother liquid crystal composition(A).

Mother liquid crystal composition(A)

	24%
	36%
	25%
	15%

As shown in the table (Declaration, p.3, Table 2), the compound (a) has a lower upper limit temperature of nematic phase than that of compound (b) and (c). Also, the compound (a) has a higher viscosity than that of compound (b) and (c). Namely, the compounds of the present invention are more useful in

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enhancing the upper limit temperature of the composition, and in lowering the viscosity of the composition. Such a fact is not disclosed in US 6,007,740 and a person of ordinary skill in the art could not predict that the compound of the present invention would be superior based on US 6,007,740.

Accordingly, the present invention cannot be obvious from the invention described in US 6,007,740 because the present invention exhibits the unexpected result described above.

In light of the foregoing, Applicant respectfully submits that US 6,007,740 could not have anticipated or rendered obvious the present invention, because US 6,007,740 fails to teach and suggest each and every claim limitation. Withdrawal of this rejection is thus respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. § 103:

Claims 2-5, 7-8, and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Andou et al. abovementioned. The Applicant respectfully traverses the rejection.

The Office indicates that although formulae (1-1) and (1-3) of the present invention are not disclosed in US 6,007,740, formulae (1-2-1) and (1-6-4) are disclosed in US 6,007,740 in columns 11 to 14, particularly in item[4] and [9] on column 5, thereby formulae (1-1) and (1-3) of the present application are easily inferred. The Applicant respectfully disagrees for the following reasons:

(1) Formula (1-3) of the present application cannot be foreseen or made obvious from US 6,007,740; because the compounds disclosed by formula (1-6-4) in columns 11 to 14 of US 6,007,740 and by item[9] on column 5 of US 6,007,740 are different from compounds expressed by formula (1-3) of the present

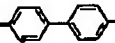


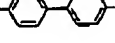
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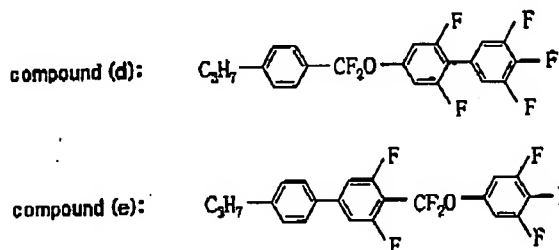
application with regard to the position of  $-\text{CF}_2\text{O}-$  bonding group as shown in Table 3.

Therefore formula (1-3) of the present application is neither taught nor suggested by US 6,007,740.

Table 3 Difference between formula (1-3) and the compound disclosed in US6,007,740

Feature of formula (1-3) of the present application	Feature of formula (1-6-4) or Item[9] of US6,007,740
alkyl group—  — $\text{CF}_2\text{O}$ —  —polar group	alkyl group—  — $\text{CF}_2\text{O}$ —  —polar group

As a typical compound from US 6,007,740, a compound (d) is selected, while as a typical compound expressed by formula (1-3) of the present application, compound (e) is selected.



Comparison is made between these compounds with regard to their characteristics relating to the lower limit temperature of nematic phase, which is a target item of the present invention. (Declaration, pp.4-6).

As for the lower limit temperature of nematic phase for a compound, as its experimental procedure is not concretely described in the specification of the present application, the Applicant describes it in detail in the following remarks and experimental procedures:

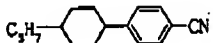
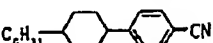
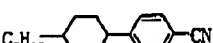

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Experimental procedure regarding the lower limit temperature of nematic phase for a compound -

- (1) Samples (compounds) are mixed with a mother liquid crystal composition (A) each in an amount of 15, 10, 5, 3 and 1 wt%.
- (2) Samples prepared in (1) are left standing in a freezer set at -20°C for 30 days.
- (3) After 30 days, samples are checked by the naked eye to determine whether or not the sample exhibits nematic phase.
- (4) If the sample exhibits nematic phase, the result is expressed as O, while the result is expressed as X if the sample exhibits crystalline phase or smectic phase.

Mother liquid crystal composition (A) :

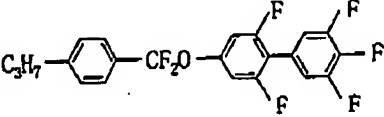
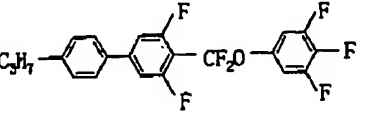
	24%
	36%
	25%
	15%

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The result of the comparison is shown in Table 4 (Declaration, p.5, Table 4) below.

Table 4 Comparison of compounds(2)

		Concentration of sample				
		15wt%	10wt%	5wt%	3wt%	1wt%
compound(d)		x	x	x	o	o
compound(e)		o	o	o	o	o

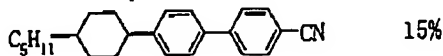
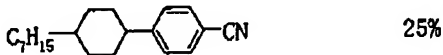
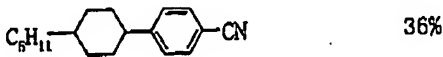
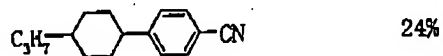
Note : Mixing each sample in the mother liquid crystal composition (A) in 15, 10, 5, 3 and 1wt% and left standing in a freezer set at -20°C for 30 days.

o means nematic phase

x means deposition of crystals or smectic phase

Mother liquid  
 crystal

composition(A)



As shown in the table (Declaration, pp. 5-6, Table 4),

- ① When concentration of the sample is 15 wt%, the compound(d) exhibits crystalline phase or smectic phase at -20°C, while the compound(e) exhibits nematic phase. Namely the compound(e), that is, formula (1-3) of the present application has the effect of lowering the lower limit temperature of nematic phase of the composition further than the compound disclosed in US 6,007,740.

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- ② To keep nematic phase at -20°C, the mixing proportion of 3 wt% at maximum is the limit for the compound(d), while 15 wt% or more at maximum for the compound(e). Namely the compound(e), that is, formula (1-3) of the present application can be mixed in a greater amount than the compound disclosed in US 6,007,740.

In summary, the compounds of the present invention are more useful from the view point of further lowering the lower limit temperature of the composition, as well as from the viewpoint of further increasing the mixing proportion than the compound disclosed in US 6,007,740. Such a fact is neither taught nor suggested in US 6,007,740. Therefore, based on US 6,007,740 it would not be obvious to a person of ordinary skill in the art that the compound of the present invention would be superior.

Accordingly, the present invention has achieved the unexpected results discussed above and is therefore, not obvious with regard to the invention described in US 6,007,740.

(2) Formula (1-1) is comprised in the contents disclosed in formula (1-2-1) in columns 11 to 14 or in item[4] in column 5 of US 6,007,740. However, from the contents disclosed there, a person of ordinary skill in the art would not be motivated to employ the formula (1-1) of the present application as an essential component by such a reason that the formula (1-1) of the present application has particularly superior characteristics.

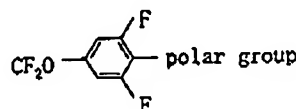
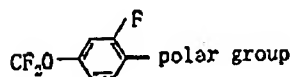
Definitely, the skeleton of the compounds disclosed there is identical to that of the formula (1-1) of the present application. However, US 6,007,740 never teaches the formula (1-1) of the present application more concretely than the basis of which is described in ① to ③ below:



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- ① The left terminal "R<sup>1</sup>" of formula (1-2-1) in US 6,007,740 is broadly defined as described on column 4 of US 6,007,740. To specifically select an alkyl (the left terminal "R<sup>1</sup>" of formula (1-1) of the present application ) among them would not be arrived at by a person of ordinary skill in the art.
- ② The right terminal "Y<sup>1</sup>" of formula (1-2-1) in US 6,007,740 is broadly defined including a halogen, CN, CF<sub>3</sub>, CF<sub>2</sub>H, etc., as described in column 4 of US 6,007,740. Still more, many atoms are included in "halogen". To specifically select -F and -OCF<sub>3</sub> (the right terminal "Y<sup>1</sup>" of formula (1-1) of the present application) among them would not be arrived at by a person of ordinary skill in the art.
- ③ There is also broadly defined that the hydrogen atom on the phenylene ring of formula (1-2-1) in US 6,007,740 may be substituted by a halogen. However US 6,007,740 never teaches concretely at which position on the phenylene the halogen could substitute or on how many positions on the phenylene ring. In addition, there are many atoms included in "halogen". To specifically select two types below



would not be arrived at by a person of ordinary skill in the art.

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Next the Applicant explains concretely through experiments that US 6,007,740 does not teach formula (1-1) of the present application as provided with specifically excellent characteristics. As a representative from US 6,007,740, Applicant selected Use Example 24 which is cited by the Office in the rejection under U.S.C.102(b). For reference, this Use Example is identical to the composition described in Comparative Example 8 of the present application. As representatives from the present application, Applicant selected Examples 1, 3, 4, 5, 10, 11 and 12 which are compositions including formula (1-1) of the present application. Comparison is made among these compounds with regard to their characteristics relating to the lower limit temperature of nematic phase and dielectric anisotropy which are target items of the present invention. (Declaration, pp.6-7).

Results of the comparison are shown in Table 5:

Table 5 Comparison of characteristics between the present invention and US6,007,740

	Typical composition of US6,007,740	Typical composition of the present application							
	Use Example 24	ex1	ex3	ex4	ex5	ex10	ex11	ex12	Range of characteristic of the present application
T <sub>c</sub> (°C)	< -20	< -30	< -30	< -30	< -30	< -30	< -30	< -30	< -30
Δε	8.3	10.6	12.6	12.2	13.2	10.8	13.5	10.6	10.6 ~ 13.2

As shown in the table (Declaration, p.6, Table 5), the lower limit temperature (T<sub>c</sub>) of nematic phase of the composition of US 6,007,740 is below -20°C, while that of the composition of the present application is below -30°C. The composition of the present application has a lower limit temperature of nematic phase lower than that of US 6,007,740. Also, the dielectric anisotropy of the

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composition of US 6,007,740 is 8.3 while those of the compositions of the present invention are in the range of 10.6 to 13.2. The composition of the present invention has a dielectric anisotropy larger than that of US 6,007,740.

Based these facts, a person of ordinary skill in the art would not arrive at the idea to make the formula (1-1) of the present invention as an essential component of the composition.

Accordingly, the present invention has achieved the unexpected results described above, and is therefore, not obvious with regard to the invention described in US 6,007,740.

(3) The Office rejected Claim 15 of the present application. However, Claim 15 depends from the claims discussed above and is therefore, patentable for at least the same reasons.

In light of the foregoing, Applicant respectfully submits that US 6,007,740 could not have made the present invention obvious, because US 6,007,740 fails to teach or suggest each and every claim limitation. Withdrawal of this rejection is thus respectfully requested.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6810 to discuss the steps necessary for placing the application in condition for allowance.


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Respectfully submitted,  
HOGAN & HARTSON L.L.P.

Date: October 27, 2004

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